EARTH SCIENCE RESEARCH

DECISION-SUPPORT INPUTS

State 2 ESMF (c. 2015):

- · Robust emission-control planning
- Routine warnings of pollution events

Simultaneous high-time and space resolved pollutants (O₃, CO, NOx, SO₂, HCHO, aerosols); Night time chemistry and transport; feedbacks between aerosols, O₃, H₂O, climate.; quantify LRT in regional pollution

NPP-NPOESS—ozone trend & aerosols. Global tropospheric winds; geographic evolution of tropospheric O₃ and aerosols.; lightning NOx emission inventories; tropospheric mixing and BL interaction. Urban-scale heat flux; high-resolution soundings

CloudSat and CALIPSO—cloud profiles. Accurate energy and water in MM5; vertical levels in lower troposphere: models incorporate radiative forcings.: landatmos-pheric interactions.; chemical-transport models

Aura—SO₂, NOx, NH₃ and aerosol products and IMPROVE network. INTEX-West; NH₃ emissions factors; MM5 and assimilation of surface moisture, heat capacity, insulation; nested model developments

AURA tropospheric residuals (O3, NO2, SO2, HCHO); NRT NOx & VOC emission inventories (top-down/ bottom-up); O₃ assimilations in CMAQ; 3-D global tropospheric chemistry in GEOS-CHEM

INTEX continental inflow-outflow; Global -to-regional models (RAQMS, GMAO)—prototype BCs in CMAQ; pollution trajectories and BL deposition of LRT of aerosols; PM network

MODIS AOD, MOPITT CO, TOMS ozone residuals—correlate to EPA ground measures; large-scale transport of aerosols; assimilations for BCs in models

Aerosol transport loops in EPA AIRNow/Air Quality Index (AQI) for regional forecasts; support EPA-developed tools for

- Multiple-day air quality forecasts

Accurate pollution forecasts updated within a day; reduced hospital visits from extreme events; improved NAAQS planning—fewer nonattainment areas: targeted mitigation for severe episodes

Clear Skies NOx/SO₂ Trading Program; longer lead-time on source and destination of ozone and aerosols; alerts to reroute airplanes; alerts to hospitals to expect specific symptoms; ozone attainment areas

Forecasts of beginning and length of annual "pollution season;" improvements from achievable SIPs—reduced haze: improved visibility, cleaner water, reduced lost work/school days

Support for goals of Clear Skies initiative; science-based attribution of source emissions; States quantify voluntary stationary emission reductions; longer-term AQI forecasts; UV-B notice

Support 2004 NOx SIP call; States justify and EPA corroborates claims for foreign-born pollution waivers; annual EPA analysis of worst 20 pollution events for trends; extend PM/O₃ forecasting to rural areas

States assess emissions-control options and emissions strategies to build attainable SIPs and improve air quality; public health and economic development opportunities; States claim waivers for foreign-born pollutants

States/locals on regional haze; evaluate exceptional events for effects on NAAQS violations; EPA PM transport rule making

GOALS/PARTNERS



Improve capabilities of air quality managers to develop and implement air quality forcasts, emission control starategies, and air quality policy







State 1 CMAQ and AIRNow/AQI (c. 2003)



Enhanced Decision Support























Where we are now

Use of Earth science observations on case-by-case project basis

Regional and intercontinental transport of air pollutants identified and research on inflow/outflow to regions

Prototype use of MODIS aerosol depth in air quality forecasts and ozone residuals for air quality planning

Where we plan to be

Routine use of Earth science products in decision tools for air quality forecasting, planning, and compliance

Use of Earth science data and model outputs and predictions supporting scenario assessments for policymaking and management

At least five separate air quality issues and decisions tools using Earth science products from at least seven sensors and models

2004 2012